

be in accordance with UHT-6(a) (4) and (5) of the ASME Code.

(d) The values of absorbed energy in foot-pounds and of fracture appearance in percentage shear, which are recorded for information when complying with paragraphs (b) and (c) of this section shall also be reported to the marine inspector or the Commandant, as applicable.

(e) Except as permitted by § 54.05-30, the allowable stress values may not exceed those given in Table UHT-23 of the ASME Code for temperatures of 150 °F. and below.

[CGFR 68-82, 33 FR 18828, Dec. 18, 1968, as amended by CGD 73-133R, 39 FR 9179, Mar. 8, 1974; USCG-2000-7790, 65 FR 58460, Sept. 29, 2000]

#### § 54.25-25 Welding of quenched and tempered steels (modifies UHT-82).

(a) The welding requirements in UHT-82 of the ASME Code shall be modified to require that the qualification of welding procedures and welders and weld production testing shall conform to the requirements of part 57 of this subchapter. The requirements are § 57.03-1(d) of this subchapter are applicable to welded pressure vessels and nonpressure vessel type tanks of quenched and tempered steels other than 9 percent nickel.

(b) [Reserved]

### Subpart 54.30—Mechanical Stress Relief

#### § 54.30-1 Scope.

(a) Certain pressure vessels may be mechanically stress relieved in accordance with the requirements in this subpart.

(b) [Reserved]

#### § 54.30-3 Introduction.

(a) Large conventional pressure vessels used to transport liquefied petroleum and natural gases, at "low temperatures" may often be difficult to thermally stress relieve. Where no other problem, such as corrosion exists, mechanical stress relief will be permitted for Class II-L pressure vessels.

(b) Mechanical stress relief serves to cause small flaws, particularly in the weld zone, to yield plastically at the

flaw tip resulting in a local relief of stress and a blunting of the crack tip. To achieve the maximum benefit from mechanical stress relief, it is necessary that the stresses so imposed be more severe than those expected in normal service life. At the same time, it is necessary that the stresses which are imposed are not so high as to result in appreciable deformation or general yielding.

(c) The weld joint efficiencies as listed in Table UW-12 of the ASME Code shall apply except that a minimum of spot radiography will be required. UW-12(c) of the ASME Code which permits omitting all radiography does not apply. Spot examination shall follow UW-52 of the ASME Code and in addition these vessels will be required to have radiographic examination of intersecting circumferential and longitudinal joints for a distance of at least 20 times the plate thickness from the junction. See § 54.25-8 on spot radiography.

(d) Severe cold forming will not be permitted unless thermal stress relief is used. For example, parts of the vessels which are individually cold formed, such as heads, must be thermally stress relieved, where the extreme fiber strain measured at the surface exceeds 5 percent as determined by:

$$\text{Percent strain} = (65t/R_f) [1 - (R_f/R_o)]$$

where:

t=Plate thickness.

R<sub>f</sub>=Final radius.

R<sub>o</sub>=Original radius (equals infinity for flat plate).

[CGFR 68-82, 33 FR 18828, Dec. 18, 1968, as amended by USCG-2000-7790, 65 FR 58460, Sept. 29, 2000]

#### § 54.30-5 Limitations and requirements.

(a) Class II-L pressure vessels which require stress relief (see Table 54.01-5(b)) may be mechanically stress relieved provided:

(1) The steels from which they are fabricated do not specifically require thermal stress relief in UCS-56 of the ASME Code and have a ratio of yield to ultimate tensile strength not greater than 0.8. For example: A-537 steels could be mechanically stress relieved.

(2) Pressure difference across the shell is not greater than 100 pounds per